

**Notice of Allowability**

Application No.

09/899,481

Examiner

Lee Fineman

Applicant(s)

LIU ET AL.

Art Unit

2872

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11/14/03.
2. ☒ The allowed claim(s) is/are 3,4,6-22,24 and 25.
3. ☒ The drawings filed on 05 July 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
  - \* Certified copies not received: \_\_\_\_\_.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
  - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No. \_\_\_\_\_.
  - (b) ☐ including changes required by the proposed drawing correction filed \_\_\_\_\_, which has been approved by the Examiner.
  - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the margin according to 37 CFR 1.121(d).

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |   |
|---|---|
| 1 <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)          |
| 2 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6 <input type="checkbox"/> Interview Summary (PTO-413), Paper No. _____             |
| 3 <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No. _____  | 7 <input checked="" type="checkbox"/> Examiner's Amendment/Comment                  |
| 4 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
|   | 9 <input type="checkbox"/> Other _____  |

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mark D. Kirkland on 6 January 2004.

The application has been amended as follows:

Amend claim 15 as follows:

15. A four-port loop optical circulator comprising:

a first, a second, a third and a fourth optical ports for receiving optical beam therein;

a plurality of optical components for guiding a beam received from said first port to project from said second port, for guiding a beam received from said second port to project from said third port, for guiding a beam received from said third port to project from said fourth port, and for guiding a beam received from said fourth port to project from said first port; and wherein said plurality of optical components includes

a walk-off crystal for generating a vertical optical path displacement for a vertical polarized optical beam and for passing a horizontally polarized optical beam therethrough maintaining a same optical path,

a vertical displacement means for shifting an optical path along a vertical

direction with a predefined vertical displacement for an optical beam transmitted with a particular polarization, and

wherein said vertical displacement means is adapted to transmit or receive said vertical polarized optical beam from said walk-off crystal, including vertically displacing the beam received from said fourth port and not vertically displacing the beam received from said second [third] port or first port.

Amend claim 25 as follow:

25. A four-port optical loop circulator comprising:

a first, a second, a third and a fourth optical ports for receiving an optical beam therein;

a plurality of optical components for guiding a beam received from said first port to project from said second port, for guiding a beam received from said second port to project from said third port, for guiding a beam received from said third port to project from said fourth port, and for guiding a beam received from said fourth port to project from said first port; and wherein said plurality of optical components includes

a walk-off crystal for generating a vertical optical path displacement for a first polarized optical beam and for passing a second polarized optical beam therethrough maintaining the same optical path,

a polarization beam splitter ("PBS") coupled to the walk-off crystal and configured to reflect a beam received at a lower optical path from said fourth port along a vertical direction for

generating a predefined vertical displacement without reflecting the beam received from said second port;

a right angle prism disposed at the predefined vertical displacement from the PBS and configured to reflect an optical beam received from the PBS in a substantially horizontal direction along an upper optical path to the walk-off crystal;

a first half wave plate for changing a state of polarization ("SOP") of light from a first SOP to a second SOP to allow light to be reflected by the PBS; and  
a second half wave plate for changing the SOP back to the first SOP after reflection by the PBS.

*Allowable Subject Matter*

2. Claims 3-4, 6-22 and 24-25 are allowed.

3. The following is an examiner's statement of reasons for allowance:

Claims 3-4 and 6-14 are allowable over the prior art for the reasons set forth in the office action dated 11 August 2003.

Claims 15-21 are allowable over the prior art for at least the reason that the prior art fails to teach and/or suggest "a vertical displacement means for shifting an optical path along a vertical direction with a predefined vertical displacement for an optical beam transmitted with a particular polarization, and wherein said vertical displacement means is adapted to transmit or receive said vertical polarized optical beam from said walk-off crystal, including vertically

displacing the beam received from said fourth port and not vertically displacing the beam received from said second port or first port” as set forth in the claimed combination.

Ducellier et al. disclose a four-port loop optical circulator (fig. 14) including a vertical displacement means (326) and including vertically displacing the beam received from said fourth port, but also including vertically displaces the beam received from said second port or first port which is not as claimed.

Cao discloses a four-port loop optical circulator (figs. 7a and 7b) including a vertical displacement means (701, 702) and including vertically displacing the beam received from said fourth port, but also including vertically displaces the beam received from said second port or first port which is not as claimed.

Claims 22 and 24-25 are allowable over the prior art for at least the reason that the prior art fails to teach and/or suggest “a polarization beam splitter ("PBS") coupled to the walk-off crystal and configured to reflect a beam received at a lower optical path from said fourth port along a vertical direction for generating a predefined vertical displacement without reflecting the beam received from said second port” as set forth in the claimed combination.

Cao discloses a four-port loop optical circulator (figs. 7a and 7b) including a polarization beam splitter (PBS) (702) coupled to the walk-off crystal and configured to reflect a beam received at a lower optical path (813, from step 806 to 807, in so far as there is a higher path from the fourth port 304, B at 812) from said fourth port along a vertical direction (fig. 8, step 803) for generating a predefined vertical displacement but includes reflecting the beam received from said second port which is not as claimed.

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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lee Fineman whose telephone number is (703) 305-5414. The examiner can normally be reached on Monday - Friday 7:30 - 4:00. Please note that as of 21 January 2004, the examiner's phone number will be changed to 571-272-2313.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (703) 305-0024. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

  
LAF  
January 9, 2004

  
MARK A. ROBINSON  
PRIMARY EXAMINER